Exploring conical intersections through high resolution photofragment translational spectroscopy

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High resolution measurements of the kinetic energies of H atom fragments formed during UV photolysis of gas phase imidazole, [1,2] pyrrole, [3] phenol [4] and thiophenol molecules show that: (i) X-H (X = N, O, S) bond fission is an important non-radiative decay process from the $^1\pi\sigma^*$ excited states in each of these molecules, and (ii) that the respective co-fragments (imidazolyl, pyrrolyl, phenoxy and thiophenoxy) are formed in very limited sub-sets of their available vibrational states. Identification of these product states yields uniquely detailed insights into the vibronic couplings involved in the photinduced evolution from parent molecule to ultimate fragments.


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